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PG&E Comments on IEPR Load Modifier Scenario Development Workshop

Additional submitted attachment is included below.

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California Energy Commission
Docket Number 23-IEPR-03
715 P Street
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RE: Integrated Energy Policy Report (IEPR) Commissioner Workshop on Load Modifier Scenario Development

Pacific Gas and Electric Company (PG&E) appreciates the opportunity to comment on the California Energy Commission's (CEC) IEPR Workshop held on August 18, 2023.

PG&E commends the CEC on a robust analysis of the variables that will shape future electricity demand. In particular, PG&E appreciates the effort and resources the CEC invested in making meaningful advancements to all its load modifier forecasting methodologies. PG&E also appreciates the CEC's intention to extend the forecast horizon to 2040.

PG&E offers three general comments on the workshop that cut across multiple load modifiers.

First, PG&E recommends that the CEC examine whether the load modifier scenario assumptions are sufficiently different in the Planning Forecast and Local Reliability Scenario to produce scenarios with meaningfully different results.

PG&E's understanding is that the difference between the Planning Forecast and Local Reliability Scenario is the selection of the Additional Achievable Energy Efficiency (AAEE) and Additional Achievable Fuel Substitution (AAFS) scenarios. Assumptions for all other components will all be the same in both the Planning Forecast and Local Reliability Scenario.[1]

Based on the workshop presentations, AAFS 3, (used in the Planning Scenario), and AAFS 4, (used in the Local Reliability Scenario), appear to be similar with the primary exception that AAFS 3 has slightly lower appliance electrification assumptions in years 2026-2029. Given the high levels of uncertainty associated with all DER adoption, impacts of emerging policy, and the resulting impacts on electricity demand, it is valuable to have Planning Scenarios and Local Reliability Scenarios that are sufficiently different to depict the range of uncertainty.

[1] Other components include economic, demographic, and price; behind-the-meter solar; behind-the-meter storage; and transportation electrification.

Second, PG&E would appreciate the opportunity to access the CEC's models and data.

PG&E is especially interested in the CEC's data concerning Behind the Meter (BTM) Self Generation, Electric Vehicles, Additional Achievable Fuel Substitution, and Committed and Additional Achievable Energy Efficiency—some of which the workshop presentations indicate have undergone substantial revisions recently. Having access to these models and data would enhance our understanding of how the CEC now performs their forecasting and would enable us to provide more detailed feedback on the modeling assumptions.

Third, PG&E recommends the CEC expand the scope of the IEPR electricity forecasting to include potential new large industrial loads such as off-road transportation, industrial electrification, data centers, cryptocurrency miners, and hydrogen production.

PG&E recognizes that forecasting these new industrial loads is challenging and would likely require substantial investment of resources; however, there is reasonable likelihood that these topics could have major impacts on a decarbonized energy system in the United States and California. Some of these new industrial loads are flexible and could play a meaningful role in improving the efficiency and reliability of California's energy resources and grid while decarbonizing our energy systems.

In the specific case of hydrogen production, such a forecast would provide a valuable, more comprehensive insight into how hard-to-electrify industrial customers and hydrogen fuel cell transportation — especially of medium- and heavy-duty vehicles — will affect electricity demands.

PG&E has structured its thematic comments below to generally correspond to the workshop agenda.

Behind-the-Meter Self Generation Forecast Updates

PG&E is supportive of the changes outlined in the workshop. In particular, the changes to the CEC's historical adoption BTM PV and BTM Storage data better aligns with PG&E's internal estimates. Moreover, the CEC's contracting with NREL to update their BTM PV and BTM Storage modeling appears to have been a valuable contribution to California's forecasting tools.

One additional area that PG&E would recommend CEC consider is how the sizing of BTM PV and BTM Storage systems may change in the future relative to recent trends. For example, transportation electrification and building electrification will increase on-site electricity needs for many customers: consequently, these customers may choose to install BTM PV and BTM Storage systems that are larger than systems typically seen today.

Updates to Better Reflect Climate Change in the Forecast

PG&E appreciates the CEC's work in incorporating localized and downscaled global climate data models for its hourly load forecast. It would be helpful to get references to the downscaling methodology. We would like to request additional information on "demand-weighting" as we are also researching how best to incorporate multiple locations at the system level. We would also like to understand how "de-trending" is performed for the four climate models and how the results are combined to estimate weather for a particular weather station.

In general, an appendix for the models and methods with mathematical equations or formulae with explanations would be valuable. We recognize that traditional planning metrics such as "1 in N" events are not yet clearly defined in this data context and would welcome discussion on applying climate models to utility and policy decision problems.

Hourly Load Model Updates

PG&E is supportive of the CEC's efforts to investigate the sensitivity of load modifiers' performance to temperature. Based on the workshop presentation, PG&E understands the CEC's intention to consider the efficiency of BTM PV at elevated temperatures. In that same vein, PG&E recommends the CEC also consider how the efficiency of other load modifiers vary by temperature. For example, the efficiency of both heat pumps and electric vehicles decreases with extreme temperatures. These temperature sensitivities are especially pertinent on winter peak and summer peak days—which typically coincide with extreme temperature events—and the 1-in-N electricity peak analyses.

Additional Achievable Energy Efficiency (AAEE) & Additional Achievable Fuel Substitution (AAFS) Updates

PG&E appreciates how rapidly the CEC has worked to substantially advance the AAFS forecast in recent years. AAFS is a particularly challenging topic to forecast because of the dearth of observed adoption data, the variability of impacts across California due to the complex diversity of building types, climates, and technologies, and the rapidly changing policy landscape. To that end, PG&E appreciates how the CEC has strategically crafted a range of valuable AAFS scenarios that effectively span and address key forecasting uncertainties, especially the impact of new policies from the California Air Resource Board and regional air districts such as the Bay Area Air Quality Management District.

Incorporating Targeted/Zonal Electrification and Gas Decommissioning Efforts into AAFS

Traditionally, fuel substitution forecasts have focused on replacement of space and water heating systems. PG&E would be interested in exploring an AAFS scenario that contemplates additional fuel substitution due to electrification of specific "zones" where a gas utility would have otherwise invested to repair or replace an existing gas pipeline.

As an example, zonal electrification could be incorporated into AAFS 5 and 6, with AAFS 6 assuming zonal electrification efforts begin in 2040 and AAFS 5 assuming zonal electrification efforts begin in 2030. As Energy and Environmental Economics, Inc (E3) highlights in its report *The Challenge of Retail Gas in California's Low-Carbon Future*, "a managed gas transition would likely require some amount of … zonal electrification to enable a reduction in the gas distribution infrastructure. Without a managed gas transition and without any effort to target electrification it would be difficult to reduce the size or scale of gas system investments and costs.[2]"

To maintain safety and reliability, the natural gas system comes with necessary operations and maintenance needs, the costs for which are approved by the California Public Utilities Commission (CPUC) in PG&E's General Rate Case. Without strategies such as full building decarbonization or zonal electrification, the gas system and its associated maintenance costs will remain relatively fixed while

[2] The Challenge of Retail Gas in California's Low-Carbon Future (ethree.com)

customer demand for gas falls. This will create an unsustainable trend in which those relatively fixed maintenance and reliability costs are spread over a smaller base of customers, leading to potential increases in gas costs. If a customer or subset of customers were to fully electrify instead, the infrastructure associated with that portion of the gas system could be retired, potentially leading to a more equitable decarbonization transition.

Incorporating Zero-Emission Appliance Standards to AAFS

PG&E is unable to evaluate the reasonableness of the zero-emission appliance standards assumptions used in the Planning Forecast and the Local Reliability Scenario due to the limited publicly-available space and water heating appliance replacement data and estimates of the impact of zero-emission appliance standards on gas appliance repair rates. Specifically, zero-emission appliance standards may have an impact on gas appliance lifespan if some customers elect to extend their gas appliance's useful life through repair rather than replace it with an electric appliance. There are many sources of uncertainty as compliance will depend on complementary policies and programs, (local, state, national), as well as compliance improvement and enforcement. If public information, including permit data, was used for these assumptions, PG&E encourages the CEC to include this in future presentations.

Separately, after reviewing Table 2 on slide five in the **"**Incorporating Zero-Emission Appliance Standards into AAFS" presentation, PG&E would like additional detail on the assumption that all newly constructed buildings will contain 100% zero-emission appliances starting in 2026 and 2029 for the residential and commercial sectors, respectively. If the assumptions reflect expectations of outcomes for the 2025 and 2028 Energy Code rulemakings, PG&E notes that it may be premature to assume all newly constructed buildings will immediately be all-electric. Based on the content shared to date in the 2025 Energy Code update pre-rulemaking workshops, specifically the "2025 Energy Code Heat Pump Baselines, Solar Photovoltaic and Energy Storage Requirements" event held on August 24, 2023[3], it is unlikely that all permitted residential new construction in 2026, 2027 and 2028 will be all-electric.

Although builders are predicted to be more likely to opt for all-electric designs than in past years due to encouragement from the Energy Code, zero-emission appliance standards, incentives, and other market factors, the rate of all-electric newly constructed buildings is unlikely to be 100% in the near term. Additionally, even if space heating and water heating are strongly encouraged by the 2025 Energy Code to be all electric, cooking, clothes drying, and fireplaces may still use natural gas unless prevented by a local jurisdiction's subsequent ordinance. PG&E believes it is premature to predict whether the 2028 Energy Code will require all-electric new construction for all covered building types, including commercial.

Baseline Transportation and Additional Achievable Transportation Electrification Forecasts

PG&E appreciates how the CEC has developed scenarios that demonstrate the impact of zero-emission vehicle policies, especially those stemming from the California Air Resources Board. PG&E expects these policies to be a major driving force for zero-emission vehicle adoption and believes it is critical to forecast the impacts of these policies on electricity demand.

To that end, PG&E notes that the CEC's current methodology of disaggregating total annual system energy across an average annual light-duty vehicle (LDV) or medium-duty and heavy-duty vehicle

[3] Staff Workshop 2025 Energy Code Heat Pump Baselines, Solar Photovoltaic and Energy Storage Requirements

(MDHDV) load profile may not accurately account for localized and short duration peak charging conditions. PG&E would encourage the CEC to continue to enhance its LDV and MDHDV annual load profiles to more closely align with observed daily and seasonal variations in peak loading conditions. A charging capacity forecast based on charger quantities and types as developed from statewide transportation electrification studies could also ensure adequate local demand is accounted for.

PG&E would also like to better understand how the CEC is considering two topics that were briefly mentioned in the workshop: the effect of temperature on EV charging efficiency and the potential impact of out-of-state vehicles being imported to bypass regulatory zero emission vehicle regulations. We are working to better understand these topics ourselves and would appreciate being informed of any related insights derived or actions taken by the CEC on these topics.

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PG&E sincerely appreciates the CEC's ongoing commitment to transparency, collaboration, and public engagement and is grateful for the opportunity to comment on this IEPR workshop. Please reach out to me if you have any questions.

Best,

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State Agency Relations